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Revision of the Claopodiums.*

By G. N. Best.

Claopodium as a subgenus under *Hypnum* was established by Lesquereux and James† to include a few species found only in the northwestern portion of the United States and the extreme southwestern portions of British America.

The *Claopodiums* occupy a position midway between the *Anomodons* on the one hand and the *Thuidiums* on the other, differing from the former by their hypnoid capsules, from the latter by the absence of filamentose paraphyllia and from both by their thickened-papillate leaf-cells. Although closely related to both of these genera it seems impossible to connect *Claopodium* with either without doing injustice to its affinities. The better way therefore is to allow it generic rank, as has already been done by Renauld & Cardot, which it deserves equally as well as either *Anomodon* or *Thuidium*.

CLAOPODIUM Ren. & Card. Musc. Am. Sept. 50. 1893.

Plant small to quite large, growing on the ground, stones, rocks or base of trees. Stems creeping, radiculose, stoloniferous; paraphyllia when present squamiform; stem leaves triangular to broadly ovate, long and narrowly acuminate, margins plane, den-

* Based chiefly on specimens furnished by Columbia University, the Geological Survey of Canada and by Mr. M. A. Howe. I am indebted to Mrs. Britton for valuable assistance in verifying synonyms and citations and in securing types.

† Mosses of North America, 327. 1884.

tate-serrate, costa translucent; leaf-cells small, round-hexagonal to rhombic, thickened-papillate on both surfaces; dioicous; pedicels roughened; capsule horizontal; annulus compound; cilia one to three; operculum long-conic to conic-rostrate; calyptra cucullate; spores small, smooth.

Key to Species.

Plants small; leaf-cells rhombic; leaves not hair-pointed.
- Plants dark green; leaves of terminal branches loosely spreading, two-ranked. 1. *Whippleanum.*
- Plants yellow-green; leaves of terminal branches erect spreading, not two-ranked. 2. *leuconeurum.*

Plants larger; leaf-cells round-hexagonal; leaves hair-pointed.
- Leaf-cells stoutly unipapillate. 3. *crispifolium.*
- Leaf-cells pluripapillate; papillae small. 4. *Bolanderi.*

1. Claopodium Whippleanum (Sulliv.) R. & C.

Hypnum Whippleanum Sulliv. Pac. R. R. Rep. 4: 190. 1856.
Thuidium leskeoides Kindb. Bull. Torr. Club, 17: 277. 1890.
Claopodium Whippleanum R. & C. Musc. Am. Sept. 50. 1892.

In spreading mats, deep to dark green; stem 2–4 cm. long, creeping, stoloniferous, flagellate, irregularly pinnately branched; stem leaves triangular to ovate-lanceolate, narrowly acuminate, subdecurrent; margins plane, dentate below, sharply serrate above; costa subpercurrent; leaf cells linear-rhomboidal below, irregularly quadrate-oblong at basal angles, indistinctly rhombic above, usually densely thickened-papillate; marginal curvilinear, echlorophyllose; paraphyllia absent; terminal branches complanate-foliate, leaves loosely spreading, narrowly lanceolate, indistinctly two-ranked; perichetial bracts oblong-lanceolate, filiform acuminate, flexuous, denticulate-serrate, inner lightly costate; pedicel roughened, subcygneus; capsule oblong-oval, rough, collum distinct, horizontal, subpendant when empty; annulus early deciduous; teeth whitish; cilia 1–3, nearly or quite as long as teeth; operculum broadly conic, short beaked; spores .009–.011; matures in spring.

Shady clay ground, rarely on base of trees. Vancouver Island (Macoun); California, coast ranges (Bigelow, Bolander, Howe)!

Type from California in Coll. Sullivant, Gray herbarium.

Illust.—Sulliv. Pacif. R. R. Report, 4: *pl.* 9. In part. 1856.

Exsic.—S. & L. Musc. Bor. Am. ed. 2, no. 407.

REM.—Rudimentary leaves, nearly destitute of papillae, with leaf-cells linear-rhomboidal and costa vanishing in the middle, are not infrequent on stolons and flagellae.

2. CLAOPODIUM LEUCONEURUM (S. &. L.) R. & C.

Thuidium leuconeurum S. & L. in Sulliv. Icon. Musc. Supp. 104. 1874.

Hypnum leuconeurum L. & J. Mosses of N. A. 328. 1884.

Claopodium leuconeurum Ren. & Card. Musc. Am. Sept. 50. 1892.

In compact spreading tufts, yellow-green; stems 2–3 cm. long; leaves of terminal branches appressed when dry, erect-spreading when moist, lanceolate, not two-ranked; inner perichetial bracts scarcely costate; pedicel minutely roughened (smooth ?); capsule small, oval; operculum long conic; in other respects as in *Claopodium Whippleanum*, of which it appears to be a depauperate form, growing in drier situations; matures in early spring.

On the ground and base of trees. California (Bigelow, Bolander, Howe).

Type locality California. Type in Coll. Sullivant, Gray Herbarium.

ILLUST.—Sulliv. Pacif. R. R. Report, 4: *pl. 9*, in part (1856); Sulliv. Icon. Musc. Supp. *pl. 80* (1874).

EXSIC.—S. & L. Musc. Bor. Am., 2 ed. No. 407[b].

REM.—A careful study of considerable material, including Nos. 407 and 407[b] of S. & L. Musc. Bor. Am., and also the types of *C. Whippleanum* and *C. leuconeurum*, kindly loaned me by Dr. B. L. Robinson, from the Sullivant Collection in the Gray Herbarium, shows but little ground for their separation. In the notes which accompany the types Sullivant admits that "they are very similar," "they grow mixed together," "*Hypnum Whippleanum* may have an annulus," and that "it is difficult to distinguish them without the fruit." The character on which he puts most stress is, as he claims, the rough pedicel of the former and the smooth pedicel of the latter. I have been unable to verify the correctness of this observation, as I find the pedicels in both more or less roughened, simply a difference in degree; in the types this difference is inappreciable.

Sullivant also claims that the leaves in *C. leuconeurum* are not

"bifariously disposed" as in *C. Whippleanum*. The leaves of the stems and primary branches are not bifarious in either, but somewhat evenly distributed; it is only the true terminal branches that show this peculiar phyllotaxis. In the less developed forms these are either absent, which is rarely the case, or so small as to be easily overlooked, giving them a more strict appearance than they would otherwise have.

In this connection reference may be made to a letter, which accompanies the types, from Lesquereux to Sullivant, calling his attention to the discrepancies to be observed in *pl. 9*, 4, of the Pacif. R. R. Reports, suggesting that the lower figures represent quite closely his *Hypnum Bolanderi* and the upper something else. On the back of this letter Sullivant writes that while the four upper figures do represent his new species, *Hypnum leuconeurum*, the others are those of the true *Hypnum Whippleanum*, "which Lesquereux never saw!" It is difficult to decide whether Lesquereux was right in his contention or not, but one thing is certain: the figures to which Sullivant refers as the *true Hypnum Whippleanum* are not drawn with his accustomed accuracy.

3. CLAOPODIUM CRISPIFOLIUM (Hook.) R. & C.

Hypnum crispifolium Hook. Musc. Exot. 1818.

Hypnum ramulosum Hampe in Muell. Syn. Musc. 2: 486. 1851.

Claopodium crispifolium R. & C. Musc. Am. Sept. 50. 1892.

Thuidium crispifolium Kindberg in Cat. Can. Plants, 6: 186. 1892.

In spreading mats, rufescent below, yellow-green above; stems 5–8 cm. long, creeping, stoloniferous, closely pinnately branched; branches simple or pinnate, spreading, attenuate, paraphyllia few, squamiform, serrate; stem leaves densely imbricated, when dry crispate-incurved, when moist erect-spreading, incurved, abruptly contracted above a broadly ovate auriculate-cordate decurrent base, linear-lanceolate, crowded with a long serrate hyaline point; margins serrate-dentate, undulate-rugose; costa narrow, vanishing in the acumen; leaf-cells small, round-quadrate, stoutly unipapillate on both surfaces; branch leaves similar but smaller; perichetial bracts loose, scarious, oblong to oblong-lanceolate, abruptly long loricate-filiform acuminate, margins bordered below by a narrow band of rhombic-hexagonal cells, lightly costate; pedicel 2½–3

cm. long, tuberculate, capsule narrowly oval-oblong, horizontal; annulus of three rows of cells, deciduous; teeth pale yellow; segments open; cilia two to three; operculum conic, long rostrate; spores .011–.013 mm.; matures in spring.

On rocks, stones and the ground, from British Columbia (Macoun) southward to California (Howe) and eastward to Idaho (Leiberg).

Type locality, west coast of North America (Menzies). Type in the Hooker Herbarium at Kew!

ILLUST.—Hook. Musc. Exot. 1: *pl. 31*. 1818. Schwaeg. Supp. 2: pt. 1, *pl. 143*. 1824.

REM.—It is impossible to make satisfactory references to exsiccatae because of the confusion existing between *Hypnum ramulosum* and *H. crispifolium*. Generally speaking, those bearing the former name are *Claopodium Bolanderi*, but not invariably so. In the set at hand, no. 405 S. & L. Musc. Bor. Am., Ed. 2, is this species. Macoun Can. Musc. no. 275, in two sets, is *C. crispifolium*.

4. CLAOPODIUM BOLANDERI n. sp.

In thin spreading mats, rufescent below, green above; stems 3–5 cm. long, creeping, stoloniferous, pinnately branched; branches simple, spreading, turgid, paraphyllia small, squamiform, serrate; stem leaves loosely imbricated, when dry crispate-incurved, when moist erect-spreading, incurved, contracted above a broadly ovate or triangular subauriculate-cordate decurrent base, lanceolate, crowned by a long serrate hyaline point, margins crenulate-serrulate, costa vanishing in the acumen; leaf-cells quadrate-hexagonal, indistinct, thickened-pluripapillate on both surfaces, papillae small, rounded, 2–5 to each cell; branch leaves smaller, ovate-lanceolate, hair pointed; perichetial bracts erect-spreading, flexuous, oblong-lanceolate, long loricate-filiform, acuminate, bordered below by a narrow band of irregular cells; pedicel 1½–2 cm. long, tuberculate; capsule short, broadly oval to suborbicular; annulus broad, deciduous; teeth pale yellow; cilia two to three, usually poorly developed; operculum conic-rostrate; spores .010–.012 mm.; matures in late winter or early spring.

On rocks, stones, rarely on the ground, from Alaska (J. M. Macoun) southward to California (Bolander) and eastward to Idaho (Leiberg).

Type locality, Marin Co., California (Bolander). Type in the Herbarium of Columbia University!

REM.—A less developed form of the preceding but easily separated from it by its smaller size, pluripapillate leaf-cells, shorter pedicel, shorter and broader capsule and imperfect cilia. The leaves are usually not so abruptly contracted above the base, broadly ovate-lanceolate, the margins not rugose.

Comparisons kindly made by Mr. Gepp, of the British Museum, verify the statement of Renauld & Cardot * as to the identity of *Hypnum ramulosum* Hpe. and *H. crispifolium* Hook., the types of both being unipapillate. The type of *Leskea laxifolia* Hook. (*H. laxifolium* Schwaeg.), loaned Mrs. Britton by the authorities at Kew, is *Brachythecium reflexum* (W. & M.) Br. & Sch.

ROSEMONT, N. J.

Mesophyl of Ferns.

BY MARY ELGIN GLOSS.

While making a comparative study of the chlorophyl bearing cells of plants, including ferns, I noticed what appeared to me to be a marked resemblance between the sections of the leaves of two species of *Adiantum*. As some species of *Nephrolepis*, *Dryopteris*, and *Polypodium* show also peculiarities of structure characteristic of each genus, I have tabulated the results of observations made from February to May, 1897.

A study of the mesophyl of ferns made from material from the greenhouses near Evanston, and from the Missouri Botanical Garden, affords some characteristic differences and resemblances. In the species studied these seem to give a means of distinguishing one genus from another, as the presence of chlorophyl in the epidermis, the form and arrangement of the cells of the mesophyl, the size of the air spaces, the number of cells in thickness of the mesophyl, the presence of palisade tissue, and the number of cells in its depth, seem to be constant through a genus.

Species were examined from the following genera: *Adiantum*, *Dryopteris*, *Asplenium*, *Nephrodium*, *Nephrolepis*, *Polypodium*, *Pteris*, *Scolopendrium*, and *Blechnum*. The sections were cut perpendicular to the smaller veins of the fresh frond, and the comparison

* Musc. Am. Sept. 50. 1892.

made of parts midway between two well developed fibro-vascular bundles.

In five species of *Adiantum* I found no palisade tissue. The cells of both upper and lower epidermis contain chlorophyl. The cells of the upper epidermis are irregular in shape toward their lower side, extending down into the mesophyl. The air spaces are relatively large and numerous. The number of cells in thickness of the mesophyl is two. I examined six species of *Dryopteris* and found a palisade tissue of two layers of cells, sometimes arranged perpendicular to the epidermis. Both layers of the epidermis contain chlorophyl. The cells of the upper are sometimes irregular in shape, where the palisade tissue is not arranged with its longer axis perpendicular to the epidermis as in *A. tripteron.* The air spaces are very large, extending through a depth of two or even three cells. There are small air spaces all through the palisade tissue. The number of layers of cells of the mesophyl is five.

In seven species of *Nephrolepis* the layers of palisade cells have their longer axes parallel to the epidermis. There is no chlorophyl in the epidermis except in *N. molle.* There are a few small air spaces in the palisade layers, while the air spaces directly over the stomata are not deeper than one cell, and in each case are covered by one long cell or the protrusions of two. The cells of the spongy parenchyma are about twice as long as the palisade cells and lie parallel to them. The number of layers in the mesophyl is six, except *N. molle* which has two, and *N. Phillipinensis*, five.

Three species of *Polypodium* have a palisade tissue of two layers of cells. There is no chlorophyl in the epidermis, almost no air spaces in the upper layers and very large spaces below, often extending to the upper layer. There is no sharp distinction between the upper and lower layers of cells in shape and size. The number of layers of cells in the mesophyl is four.

In eight species of *Pteris* there is a palisade tissue of one layer, in *P. Cretica* of three layers. In four species chlorophyl is present in the epidermis, and in four there is no chlorophyl in the epidermis. The air spaces are very large and numerous. The cells of the lower layers of the mesophyl are sinuous and very irregular in shape and size. The number of layers of cells in the

depth of the mesophyl is from four to six, except in *P. cretica* which has ten.

Scolopendrium has no palisade tissue; has chlorophyl in the epidermis; has many large air spaces and irregularly shaped cells; and nine layers of cells in the mesophyl.

Sachs says, "According to Stahl the palisade cells constitute that form of assimilating tissue, which is especially produced by intense light striking the leaf directly, and leaves grown in the shade produce chiefly or only spongy parenchyma." In the ferns I have examined the form of the cells of the mesophyl does not seem to depend on the intensity of the light, as most ferns grow naturally in diffuse light and the cultivated species which I have sed were grown in the shade. In some of these ferns a marked palisade structure is apparent as in *Dryopteris falcata* where it consists of two layers of cells, of rectangular section; *Pteris aquilina* has also two layers; *Pteris sagittifolia* has one layer; *Pteris Cretica*, three and *Blechnum serrulatum*, two. Intermediate between this evident palisade structure and none at all, I find some which have one or more layers of closely placed cylindrical cells, with axes nearly equal. *Polypodium aureum* has two layers of these cells. *Polypodium vulgare*, grown in bright sunlight, and *Nephrolepis exaltata* have also two layers. *Dryopteris Mexicana*, *D. Filix-mas*, *Asplenium fabianum*, *Pteris serrulata*, and all the five species of *Adiantum* which I examined have no palisade parenchyma. The palisade tissue could not have been formed by intense sunlight, but rather it seems that the presence or absence of palisade parenchyma is very nearly constant throughout each genus, that is, it is a generic characteristic.

The ferns which have no palisade cells possess chlorophyl in the epidermis. It may be that this chlorophyl in the upper epidermis takes the place of a palisade layer. Terlitaki in a paper on *Struthiopteris* and *Pteris* says that ferns are distinguished by the presence of chlorophyl in the epidermis. Many of the ferns which which I examined had chlorophyl in the epidermis layers, as the genus *Dryopteris*, which had also a palisade tissue, and four species of *Pteris*, *Blechnum serrulatum*, *Scolopendium* and *Asplenium* There are, however, many which have no chlorophyl in the epidermis, as the genus *Nephrolepis*, *Polypodium* and four species of *Pteris*. These have without exception a palisade structure.

From the species I have examined it appears, first, that in any one genus the number of cells in thickness of the mesophyl is constant; *Adiantum*, 2; *Dryopteris*, 5; *Nephrolepis*, 6; *Polypodium* 4. Second, the presence of chlorophyl in the epidermis is characteristic of a genus. *Adiantum* and *Dryopteris* possess chlorophyl in epidermis and *Nephrolepis* and *Polypodium* do not. Third, the relative size and shape of the air spaces is constant throughout a genus. Fourth, the shape and arrangement of the cells are somewhat constant. Fifth, the presence of palisade tissue and the number of cells in its depth are constant through a genus.

These characteristics taken one with the other appear to form a means sufficient to distinguish one genus from another.

	No. Cells in Mesophyl	No. Cells in Palisade	Depth of Frond	Chlor. in Epidermis	Air Spaces
Adiantum					
Capillus-veneris	2	0	106	Chlor.	Large
tenerum	2	0	77	Chlor.	Large
pedatum	2	0	70	Chlor.	Large
trifidum	2	0	77	Chlor.	Large
Nephrolepis					
molle	2	0	110	Chlor.	Small, very
Phillipinensi	5	2	110	Chlor.	Small, 1 cell
tuberosa	6	2	198	No Chlor.	Small, 1 cell
davalloides	6	2	185	No Chlor.	Small, 1 cell
Collengerii	6	2	176	No Chlor.	Small, 1 cell
exaltata	6	2	176	No Chlor.	Small, 1–2 cells
Polypodium					
aureum	4	2	176	No Chlor.	Large, very
vulgare	4	2	198	No Chlor.	Large
reptans	4	2	132	No Chlor.	Large
Dryopteris					
Mexicana	5	2	171	Chlor.	Large, very
Filix-mas	5	2	146	Chlor.	Large, very
Thelypteris	5	2	143	Chlor.	Large, very
triptera	5	2	114	Chlor.	Large, very
falcata	6	2	440	Chlor.	Large, very

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A new Species of Bidens.

By Karl M. Wiegand.

Field observations convinced me some time ago that there were at least two distinct species included under *B. connata* Muhl. In order to determine accurately if this was indeed the case, considerable material was collected during the summer of 1896, which was carefully studied in connection with herbarium material from various parts of the United States. The original supposition proved to be correct, and in addition to the difference in general appearance several less obvious but quite as important distinguishing characters were discovered through the close examination of the material. It is possible, therefore, at present to separate from *B. connata* the form first noticed long ago by Dr. Gray and named by him *B. connata comosa* in the fifth edition of the Manual, but which was again later abandoned as not being sufficiently distinct from the type. The difference in general appearance between *B. connata* and *B. comosa* is very striking, the stramineous color of the stem, foliaceous involucre and pale yellow flowers of the former being quite in contrast to the purple stem, small involucre and orange flowers of *B. connata*. Mr. E. P. Bicknell writes me that he has observed practically the same differences between the two species, and I am much indebted to him for the use of his valuable field notes. The following description has been prepared to bring out more in detail the characters of this neglected species:

Bidens comosa (Gray) n. sp.

B. connata var. *comosa* Gray, Manual, ed. 5; 261. 1867.

Stem 2–10 dm. high, rather strict and stout, stramineous, as well as the comparatively short simple branches; leaves simple, lanceolate or elongate-lanceolate, coarsely serrate with mostly smaller and more ascending teeth than in *B. connata*, pale, dull green, gradually tapering toward each end; petioles short and broadly margined, connected at the base by a narrow ring, the acute or slightly acuminate apex mostly entire and blunt, glabrous except the margin, veins parallel, ascending, terminating either in the teeth or sinuses; heads cymosely arranged on short stout branches, therefore often appearing clustered, large (12–15 mm. high by 15 mm. broad), densely flowered; outer involucre very

large, the obtuse bracts spatulate or lanceolate, entire, serrulate or dentate, 2–4 times the length of the head (in one case 5 cm. long); corolla 4 mm. long, mostly 4-lobed, pale greenish-yellow, narrowly funnelform, tapering gradually to the base; stamens and style included; achenes rather large (body 7–9 mm. long by 3 mm. broad), evenly cuneate, very flat, scarcely carinate, glabrous and smooth except the margin on which the retrorse hairs extend to the base, dark greenish-yellow and often minutely dark dotted, flat or convex at the summit; awns commonly three (two long and one shorter), long, straight and stout (⅓–¾ length of achene), equaling or longer than the corolla.

Eastern States, westward to Illinois.

The stem and more slender branches of *B. connata* are purplish, leaves more slenderly petioled, often 3-parted, more acuminate and darker green; heads smaller, bracts of the involucre fewer, twice the length of the heads or less, narrower; corolla deep orange yellow, abruptly contracted below the middle and commonly 5-cleft; stamens often exserted; achenes smaller, darker, often strongly carinate, commonly hairy and tuberculate, margins with mixed upwardly and downwardly directed or entirely erect hairs; awns 2–4, shorter (¼–½ length of achene).

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Shrubs and Trees of the Southern States.—II.

By John K. Small.

I. New and Noteworthy Species.

Tsuga Caroliniana Engelm. Coult. Bot. Gaz. 6: 223. 1881.

Last fall I received specimens of this very ornamental hemlock from two new localities in North Carolina. Mr. A. M. Huger found groves of it at Banner's Elk, Watauga County, at an elevation of 1300 meters and in the Linville Gorge, Burke County, at about 575 meters above sea-level, the latter station, together with that at Tallulah Falls, Georgia, and the New River, Virginia, representing the lowest altitudes at which the species has been found.

Hicoria glabra (Mill.) Britton, Bull. Torr. Club, 15: 284. 1888.

Among the many unique things that Stone Mountain affords are some dwarf hickory trees, usually less than two meters in height, bearing quite an abundance of fruit.

QUERCUS MINIMA (Sarg.)

Quercus virens var. *dentata* Chapm. Fl. S. States, 421. 1860. Not *Q. dentata* Bartr. 1794.

Quercus Virginiana var. *minima* Sarg. Silva N. A. 8: 101. 1895.

A low shrub forming wide patches by the extensive spreading of the underground stems. Branches erect or ascending, less than 1 meter tall, solitary or several together, simple, or branched above; leaves firm, obovate or sometimes oblong to oblanceolate, 3–10 cm. long, acute or apiculate at the apex, repand-serrate, or the upper ones sometimes entire, those of the shoots often lobed, all glabrous or finely tomentose beneath, gradually or abruptly narrowed into short petioles which vary from 2–5 mm. in length; staminate aments very slender, 1–4 cm. long, tomentose; acorns solitary or several at the ends of peduncles which vary from 1–3 cm. in length, or sometimes sessile; cups turbinate-hemispheric, about 1.5 cm. broad, white-tomentose, the bracts appressed, thickened on the back, except near its edge where they form a fringe; nuts ovoid or elliptic, 1.5–1.8 cm. long, dark brown, glabrous.

Sandy sterile pine barrens, Florida, chiefly near the coast. Flowers in March and April; matures its fruit in the fall.

This peculiar oak cannot pose as a variety of *Quercus Virginiana* under any reasonable considerations. It may be of interest to note that it bears much the same relation to *Quercus Virginiana* as *Castanea nana* does to *Castanea pumila* or *Castanea dentata*. The habit of *Quercus minima*, with its underground stems, and low erect branches which are usually much less than one meter in height, is enough to separate it specifically from the gigantic forest tree *Quercus Virginiana*. In addition to the differences in habit just mentioned, the leaf types are characteristic and the nerves in the leaves of *Quercus minima* are much more prominent than they are in the live oak. The cups seem to furnish a diagnostic character, those of the *Quercus minima* being of a turbinate type, while those of *Quercus Virginiana* are hemispheric.

QUERCUS GEMINATA n. sp.

A shrub or small tree, 2–5 meters tall, with a maximum trunk diameter of about 15 cm. Leaves narrowly oblong, elliptic, or oblong-oblanceolate, 3–6 cm. long, entire, obtuse or apiculate, strongly revolute, mostly gradually narrowed at the base, glabrous and parchment-like above, finely tomentose and conspicuously rugose by the prominent nerves beneath; petioles 2–6 mm.

long; flowers not seen; acorns usually 2 at the end of a peduncle, which varies from 1–4 cm. in length; cups turbinate, 1 cm. broad, tomentose, the bracts appressed, slightly thickened near the base of the cup, fringed at the edge; nuts ovoid or narrowly oval, 1–1.7 cm. long, twice or thrice as long as the cups.

Sandy soil, chiefly in the scrub, Florida. Flowers in spring and matures its fruit in the fall.

Mr. Nash, who collected and observed this plant during the seasons of 1894 and 1895, assures me that it is perfectly distinct from its relatives. This is doubtless a fact, and both the foliage and fruit furnish excellent characters. The very prominently rugose lower leaf-surfaces and the strongly revolute leaf-margins have no parallel in *Quercus Virginiana*. The acorns are always borne in pairs at the ends of short stout peduncles; the turbinate cups with their constricted bases are diagnostic.

Celtis Georgiana n. sp.

A diffuse shrub with slender often 2-ranked branches, the leafy twigs more or less pubescent. Leaves ovate, 2–5 cm. long, averaging 2.5 cm. in length, or those on vigorous shoots sometimes 6 cm. long, acute, entire or sharply serrate above the middle, inequilateral, rounded or truncate at the oblique base, dark green, scabrous and occasionally sparingly pubescent above, paler and glabrous beneath, except for a few hairs on the nerves; petioles 1.5–4 mm. long, pubescent; pedicels usually slightly curved, 1.5–4 mm. long, pubescent; drupes subglobose, sometimes broader than long, 6–7 mm. in diameter, tan-color, smooth and glabrous, or sometimes glaucous; seeds obovoid-globose.

Along or near streams, north-central Georgia. Flowers in the spring; matures its fruit in September.

Collected by the writer, first in the Yellow River Valley, near McGuire's Mill, Gwinnette County, in 1893, and in succeeding years at many points about Stone Mountain and the contiguous region.

A low species related to *Celtis pumila*, from which it may be distinguished by its smaller merely acute leaves, the very short pedicels and the smaller tan-colored drupes.

Celtis Helleri n. sp.

A much branched, wide spreading tree, sometimes 10 meters tall with a maximum trunk diameter of 1.5 meters. Bark of the

trunk and main branches with numerous corky warts; leaves rather firm, the blades ovate to oblong, 4–7 cm. long, obtuse or acute, crenate-serrate, especially above the middle, rounded or subcordate at the base, deep-green and scabrous-pubescent above, pale and tomentose beneath, slightly inequilateral, oblique at the base; petioles stout, 3–4 mm. long, tomentose; pedicels sparingly pubescent, curved, 1–1.5 cm. long; drupe subglobose, 7–9 mm. in diameter, light-brown, translucent, smooth and shining; seeds globose, strongly 4-ribbed, prominently reticulated.

In dry ground near San Antonio, Texas.

A rather low tree with a short stout trunk varying from .5–1.5 meters in diameter, and a wide spreading top. The branches are numerous and bulky. The original specimens were gathered by Mr. Heller from trees growing in a strip of woodland between the city of San Antonio and the San Antonio River, Texas, no. 1587.

TOXYLON POMIFERUM Raf. Am. Month. Mag. 2: 118. 1817.

Years ago the osage orange was planted on Paris Mountain, South Carolina, for hedges and for ornamental purposes. For many years the settlements have been neglected and deserted and the tree has spread and established itself in an astonishing manner, now appearing as if indigenous.

ALBIZZIA JULIBRISSIN Durazz. Mag. Tosc. 3: 11. 1772.

Although not indigenous, this tree now appears as if it were native in the southern states. It grows along roadsides and here and there through the pine woods much as the honey locust (*Gleditsia triacanthos*) does in many localities. It ranges from North Carolina to Georgia, Florida and Alabama, where Prof. Underwood collected specimens during the past summer. It is quite abundant in southern Georgia.

AMORPHA VIRGATA Small, Bull. Torr. Club, 21: 17. *pl. 171.* 1894.

In the spring of 1896 Dr. Charles Mohr sent me a specimen of *Amorpha virgata* from the mountains of Madison county, Alabama, thus extending the known geographic range of the species from Stone Mountain, Georgia, to northern Alabama. Dr. Mohr gives the altitude of this locality as 350 meters. While collecting at different points along the eastern section of the Blue Ridge dur-

ing the summer of 1896, I was surprised to find the species both on the slopes and summit of Paris Mountain near Greenville, and on the slopes of Table Mountain. At the former locality it occurred at an altitude of about 500 metres, and on Table Mountain it ranged from 800–900 meters. Its characters hold perfectly.

LONICERA FLAVA Sims. Bot. Mag., *pl. 1318.* 1810.

About two years ago I recorded* several new localities for this handsome honeysuckle. Further exploration of the southern end of the Blue Ridge has revealed additional stations. In the summer of 1894 I found some bushes on the upper slopes of Currahee Mountain, an isolated peak near Toccoa, Georgia, and a little later noticed several bushes on Stone Mountain. During the past summer I collected it on Paris Mountain, South Carolina, the original locality, where it grows at several points along the rocky summit, and later discovered a new station on the precipitous cliffs of Table Mountain, in the same state. At the latter place the shrubs were more robust and vigorous than at any of the other stations.

The finest flowering specimens I have ever seen were sent me by Mr. A. M. Huger, who secured them on Tyron Mountain, Polk County, North Carolina, last spring. Mr. Huger's discovery extends the range of the species into another state, but although we now have specimens showing the species to range from North Carolina to Georgia, it is not common at any of the localities, a few bushes only existing at the different places.

II. THE GENUS GAYLUSSACIA IN THE SOUTHERN STATES.

During several seasons I have had ample opportunity to study this imperfectly understood group in the field and have made observations on all except one of the species recognized in the appended revision. As far as I can see, the forms hitherto considered as varieties of other species are abundantly distinct and should be treated as species. Mr. Nash came to the same conclusion during his field-work in Florida. The diagnostic characters are brought out in the following key and descriptions.

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* Bull. Torr. Club, 21: 305.

Corolla campanulate or globose campanulate; leaves destitute of sticky resin.
Stems horizontal, underground, the branches erect.
Pubescence consisting of gland-tipped hairs.
Twigs and racemes pilose. 1. *G. dumosa.*
Twigs and racemes bristly-hispid. 2. *G. hirtella.*
Pubescence consisting of simple non-glandular hairs.
Leaves glaucous, glabrous or nearly so. 3. *G. nana.*
Leaves densely tomentose, especially beneath. 4. *G. tomentosa.*
Stems erect, the branches spreading.
Leaves leathery, obtuse or retuse; drupe glaucous. 5. *G. frondosa.*
Leaves thin, acuminate and apiculate; drupe black. 6. *G. ursina.*
Corolla conic; leaves sticky with a resinous secretion. 7. *G. resinosa.*

1. Gaylussacia dumosa (Andr.) T. & G.

Vaccinium dumosum Andr. Bot. Rep. **8**: 112. 1794.

Gaylussacia dumosa T. & G.; A. Gray, Man. 259. 1848.

A low shrub, 1–5 dm. tall, with underground stems and erect solitary or tufted branches; the twigs, leaves and inflorescence glandular-pilose. Leaves leathery, the blades oval, obovate or oblanceolate, rarely linear-oblanceolate, 2–4 cm. long, apiculate at the apex, ciliate, short-petioled, deep green above, paler beneath; calyx glandular, about 5 mm. broad, the segments triangular or triangular ovate, acute, about as long as the tube; corolla campanulate, 5–6 mm. long, white or pink, wax-like, the segments broadly ovate, more or less recurved and revolute; filaments short, pubescent; anthers longer than the filaments, prolonged into filiform tubes; drupe globose, black, 6–8 mm. in diameter, commonly somewhat pubescent.

In sandy soil, Newfoundland and along the coast to New York, south to eastern Pennsylvania, North Carolina, Florida and Louisiana. Spring; matures its fruit in the summer.

2. Gaylussacia hirtella (Ait.) Klotzsch.

Vaccinium hirtellum Ait. Hort. Kew. Ed. 2. **2**: 357. 1811.

Gaylussacia hirtella Klotzsch, Linnaea, **14**: 48. 1840.

Gaylussacia dumosa var. *hirtella* A. Gray, Man. 259. 1848.

A shrub, with underground stems, the branches, twigs and inflorescence bristly-hispid, the tips of the hairs with minute glands; leaves firm, the blades oblanceolate-spatulate or elliptic, 3–6 cm. long, apiculate, glandular-ciliate sparingly hispid above, short-petioled; racemes many-flowered; calyx hispid, 6 mm. broad, the segments triangular, rather acuminate, about as long as the tube; corolla broadly campanulate, 7–8 mm. long, the segments broader than long, the tips recurved, the edges revolute; filaments short,

pubescent; anthers longer than the filaments, prolonged into filiform tubes; drupe not seen.

In sand, Florida to Louisiana. Spring; fruit ripe in the summer.

Certainly distinct from *Gaylussacia dumosa*, from which it differs in habit, size and leaf characters. The pubescence is always diagnostic, the corolla is larger and much thinner than that of *G. dumosa*, while the calyx-segments are longer and usually acuminate.

3. Gaylussacia nana (A. Gray).

Gaylussacia frondosa var. *nana* A. Gray, Syn. Fl. N. A. Ed. 2. 2: Pt. 1, 396. 1886.

A low glaucous shrub 1–4 dm. tall, spreading by underground stems. Leaves leathery, the blades elliptic, obovate or nearly spatulate, 2–3 cm. long, obtuse or minutely apiculate at the apex, glaucous on both sides, becoming bright green above, prominently rugose and sprinkled with amber-colored resin beneath, short-petioled; racemes few-flowered; pedicels slender, puberulent when young; calyx glabrous, 3 mm. broad, the segments triangular, acute, about as long as the tube; corolla globose-campanulate, 3 mm. long, the segments ovate, acutish, longer than broad; filaments short, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupes subglobose, 6–7 mm. in diameter, rather dry, glaucous.

In sandy pine barrens, Georgia to Florida and Alabama. March to April; matures its fruit in the summer.

Easily distinguished from *Gaylussacia frondosa*, with which it has been associated, by its very glaucous foliage and strongly rugose and much smaller leaves, besides its peculiar underground stems.

4. Gaylussacia tomentosa Pursh.

Gaylussacia frondosa var. *tomentosa* A. Gray. Syn. Fl. N. A. 2: Pt. 1, 19. 1878.

Gaylussacia tomentosa Pursh; A. Gray. Syn. Fl. N. A. 2: Pt. 1, 19. As synonym. 1878.

A low shrub, spreading by underground stems, the foliage tomentose with brownish hairs. Leaves leathery, the blades oblong or elliptic, often slightly broadest above the middle, 2.5–7 cm. long, obtuse and apiculate at the apex or sometimes notched, brown-tomentose on both sides, densely so beneath, short-petioled;

racemes few-flowered; pedicels 1–1.5 cm. long, much longer than the bracts; calyx glabrous, about 3.5 mm. broad, the segments ovate, acute, about as long as the tube; corolla campanulate, 3.5 mm. long, the segments ovate, obtuse, about as long as broad, the tips recurved, the edges revolute; filaments dilated, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupes depressed-globose, 8–9 mm. in diameter, glaucous.

In sandy soil, Georgia and Florida. Spring; matures its fruit in the summer.

Like the preceding species, *Gaylussacia tomentosa* has underground stems, but it differs from it in the brown-tomentose foliage, more robust habit, larger leaves and different leaf-form. The fruit of *G. tomentosa* is larger and much more fleshy than that of *G. nana*.

5. GAYLUSSACIA FRONDOSA (L.) T. & G.

Vaccinium frondosum L. Sp. Pl. 351. 1753.

Gaylussacia frondosa T. & G.; Torr. Fl. N. Y., 1: 449. 1843.

An irregularly branched shrub 1–2 meters tall, with puberulent twigs and young leaves. Leaves firm, the blades oblong-oblanceolate, ovate, oval or obovate, obtuse or notched at the apex, delicately revolute, short-petioled, bright green and glabrate above, glaucous and sprinkled with minute golden globules of resin beneath; racemes loose; pedicels long and slender; calyx glabrous, 3–4 cm. broad, the segments triangular, acute or acutish, about as long as the tube; corolla globose-campanulate, about 4 mm. long, green to purplish, the segments triangular, broader than long, recurved and revolute; filaments dilated, glabrous; anthers longer than the filaments, prolonged into slender tubes; drupe globose, 8–10 mm. in diameter, with a pale bloom.

In sandy soil, New Hampshire, south to Florida, Kentucky and Louisiana. Spring; matures its fruit in the summer.

6. GAYLUSSACIA URSINA (M. A. Curtis) T. & G.

Vaccinium ursinum M. A. Curtis, Am. Journ. Sci. **44**: 82. 1843.

Gaylussacia ursina T. & G.; A. Gray, Mem. Am. Acad. (II.) 3: 49. 1846.

A straggling branching shrub, 6–15 dm. tall, with sparingly pubescent twigs and young foliage. Leaves thin, the blades oblong, elliptic or oblanceolate, usually rhomboidal, 4–10 cm. long, usually short-acuminate; apiculate, ciliate, deep green above, paler beneath, pubescent on the nerves on both sides, obtuse or rounded at the base, short-petioled; flowers few, in lateral somewhat drooping racemes; calyx with numerous golden glands, about 3 mm.

broad, its 5 segments very low, obtuse, several times shorter than the tube; corolla globose-campanulate, greenish-white or tawny-red, about 4–5 mm. long, its segments triangular, acutish, recurved, revolute; filaments dilated, pubescent, incurved at the apex, longer than the anthers which have short tubes at the apex; drupe globose, 10–12 mm. in diameter, black, shining, sweet.

In deep forests on the mountains, North Carolina to northern Georgia. Spring; matures its fruit in the late summer.

7. GAYLUSSACIA RESINOSA (Ait.) T. & G.

Vaccinium resinosum Ait. Hort. Kew. 2: 12. 1789.

Gaylussacia resinosa T. & G.; Torr. Fl. N. Y. 1: 449. 1843.

A rigid branching shrub 3–12 dm. tall, its twigs and foliage more or less pubescent and sticky with a resinous secretion when young, leaves firm, the blades elliptic, oval or oblong, sometimes broadest above the middle, firm, obtuse or apiculate, entire, ciliolate, short petioled; flowers in lateral drooping racemes; pedicels 2–8 mm. long, usually with two narrow bracts; calyx about 2 mm. broad, its 5 segments ovate, obtuse, about as long as the tube; corolla obconic, red or reddish-green, 5–6 mm. long, more or less constricted near the apex, the segments ovate, spreading or recurved, revolute, obtuse; filaments winged, pubescent, shorter than the anthers, each cavity of which is prolonged into a tube; drupes globose, 6–10 mm. in diameter, black or rarely white, sweet.

In rocky woods and hillsides, Newfoundland to the Saskatchewan, south to Georgia. Spring; matures its fruit in the summer.

New Species of Lichens from Southern California as determined by Dr. W. Nylander and the late Dr. Stizenberger.

BY H. E. HASSE.

PARMELIA SUBOLIVACEA Nyl.

Thallus similar to *P. olivacea* (L.) Ach., but differing in size of spores, these being 8–9 by 5 mic., and also in the spermatia.

On rocks, San Gabriel Mountains at 1500 meters alt. July, 1894.

HEPPIA TERRENA Nyl.

Thallus monophyllous, round, olive green, with repand border; apothecia single in the fronds, circular, depressed, dull red; spores colorless, globular, 4 mic. in diameter.

On earth, San Gabriel Mountains, ascending to 1500 meters alt.; also near Santa Monica. August, 1896.

LECANORA PLEISTOSPORA Nyl.

Thallus of separate pruinose rounded squamules light brown; apothecia from urceolate to open, flat, black or pruinose with cinerescent-scales that also cover the thick prominent entire or crenulate margin; spores minute and numerous; paraphyses thick, agglutinated, with round light brown apices; hypothecium colorless. Hym. Gel. J. + faintly yellow.

On clay soil near Soldiers' Home, Los Angeles Co. May, 1896.

LECANORA PLEOISPORA Nyl.

Thallus of rounded, separate or approximate and angular squamules, dull brown, with whitish furfuraceous scales; apothecia from urceolate to open, flat, disk dull black and the thick margin clothed, as is the thallus, with cinerescent scales; spores about 40 in asci, globular, 10 to 12 mic. in diameter; paraphyses slender, separate, with yellowish apices; hypothecium colorless. Hym. Gel. J. + faintly yellow.

On clay. Original locality San Gabriel Mountains, at 700 meters. August, 1896.

LECANORA REDIUNTA Stiz.

Thallus crustaceous, rimose, areolate, whitish and cinerescent; apothecia black, pruinose, convex; margin entire, prominent or finally nearly disappearing; spores fusiform, blunt-pointed, colorless, 3-septate, slightly convex, 24 by 5–6 mic.; hypothecium brown. Hym. Gel. J. + yellowish.

On various barks. Original locality Santa Catalina Island. January, 1895. Also on the mainland near the coast on *Umbellularia Californica*.

LECANORA OBPALLENS Nyl.

Thallus cartilaginous of small rounded separate rugulose squamules, light chestnut, K—CaCl—; apothecia flat, black, with a prominent crenulate thalline margin; spores minute and numerous.

On earth. Santa Monica Range, near Soldiers' Home, Los Angeles Co. November, 1896.

LECANORA (PLACODIUM) SUBPYRACEELLA Nyl.

Thallus pulverulent, ochroleucous scaly, or evanescent; apo-

thecia small, disk dull orange, with a thin entire raised margin of lighter color; spores 20–24 mic., 1-septate with approximate cells.

On earth near Santa Monica. November, 1896.

LECANORA STENOSPORA Stiz.

Thallus cartilaginous, in the centre of separate rounded or approximate, then angular convex squamules; those at the circumference extending into short broad contiguous rounded lobules, citrine yellow; apothecia small depressed becoming flat and superficiai, immarginate; spores minute and numerous; paraphyses short, thick, agglutinated. Similar to *L. chlorophana* Tuck. but this has a thalline margin and long slender separated paraphyses.

On granite, San Gabriel mountains, from 1600 meters upward. July, 1894.

RINODINA ANGELICA Stiz.

Thallus cartilaginous, rimose-areolate, the areoles ample and at the circumference lobed, light grayish flesh colored, upon a black hypothallus; apothecia prominent with a thick entire or crenulate thalline margin, disk brown-black; spores 1-septate, brown, blunt, ellipsoid, 28 by 12 mic.; hypothecium colorless.

Rocks, frequent, ascending to 1800 meters altitude.

LECIDEA DOLODES Nyl.

Thallus of small convex distinct squamules, becoming crenate and imbricated, light chestnut color; apothecia black with a raised somewhat lighter colored margin, flat to slightly convex and immarginate; spores simple, globular, in tubular asci, 7–9 mic. in diameter; paraphyses distinct, capillary.

On bark of *Abies*, San Gabriel mountains, at 2000 meters alt. August, 1896.

LECIDEA SUBPLEBIA Nyl.

Thallus pulverulent, rimose-areolate, dull white, K—CaCl—; apothecia from flat to slightly convex, black, with a thin crenulate black margin, this finally disappearing; spores 10–12 by 6–7 mic., simple; hypothecium colorless; paraphyses articulate with small globular heads.

On earth and calcareous pebbles near Santa Monica. November, 1896.

LECIDEA CATALINARIA Stiz.

Thallus of subglobular entire or crenulate globules, distinct or approximate, pale citrine yellow; apothecia small to middling,

flat, with a thin entire or slightly sinuate margin, becoming convex, conglomerate, and the margin disappearing; spores ovoid, ellipsoid, 14–18 by 9–10 mic., colorless; paraphyses with dark globular agglutinated heads; hypothecium brown.

On sandstone, Catalina Island. January, 1895.

LECIDEA (BIATORA) PHAEOPHORA Stiz.

Thallus pulverulent, dirty white, rimose; apothecia slightly convex, contiguous and angular by approximation, dull flesh color, the thin lighter margin disappearing; spores blunt, ellipsoid, colorless, 16 by 7 mic.; hypothecium colorless.

Rocks, Catalina Island. January, 1895.

LECIDEA SQUALIDA PERSIMILANS Nyl.

Thallus of turgid convolutions forming rugulose cushions, light olive green; apothecia prominent, flat and medium size with a thin margin, becoming large, convex, subglobular, contorted and lobed, the margin disappearing, black with a brownish bloom; spores acicular, thickened at one end, straight or slightly curved, 60 by 5–6 mic., 5–8-septate, colorless.

Earth on rocks. San Gabriel Mountains at 1800 meters alt August, 1896.

ARTHONIA SUBDISPUNCTA Nyl.

Thallus whitish, cinerescent, finely furfuraceous; apothecia roundish or oblong, slightly elevated, black; spores 1-septate, obovate, colorless, 11 by 4 mic.

On the stalks of *Leptosyne gigantea* Kellogg, at Point Dumas near Santa Monica. (This is also a new station for that composite in Los Angeles county, it being heretofore accredited solely to Catalina Island.)

VERRUCARIA PLUMBARIA Stiz.

Thallus of white appressed scales, forming an ashy gray, smooth surface, bordered by a narrow rim of black hypothallus; apothecia black, small, shining, subglobular with a minute orifice at apex; perithecium dimidiate; spores ellipsoid, acute at both ends, 14–16 by 5 mic., each spore-cell constricted, colorless, in tubular spore-sacs; paraphyses capillary, distinct.

On *Quercus agrifolia* and other barks, abundant. Near Santa Monica.

VERRUCARIA INDUCTULA Nyl.

Thallus smooth, rimose-areolate, dull brownish; apothecia elevated, pustular, entirely covered by thalline structure; perithe-

cium dimidiate; spores colorless, muriform 32 by 14 mic; paraphyses capillary; hypothecium colorless, K—, CaCl—, J+; spores yellow.

On shale, Santa Monica Range.

VERRUCARIA SUBMURALIS Nyl.

Thallus rimose-areolate, dull olive green to blackening; apothecia prominent, the bases covered by thallus; perithecium black, exposed at apex, with minute aperture, dimidiate; amphithecium brown; spores obovoid, ellipsoid, colorless, simple, 32 by 14 mic. Hym. Gel. J. + vinous; spores yellow.

On granite, San Gabriel Mountains at 1500 meters alt. July 1884.

VERRUCARIA SQUAMELLA Nyl.

Thallus of small crenate lobulated imbricated dull greenish squamules; apothecia innate, one to several in each squamule, the orifice indicated by a minute dark dot; spores simple, oblong, ellipsoid, colorless, 20–24 by 8 mic.; paraphyses indistinct.

On shaded earth among moss near Santa Monica. February, 1897.

The Botanical Society of America.

The third annual meeting was held at the University of Toronto on Tuesday and Wednesday, August 17 and 18, 1897, under the presidency of Prof. J. M. Coulter.

The address of the retiring president, Prof. C. E. Bessey, on "The Phylogeny and Taxonomy of the Angiosperms," was delivered on Tuesday evening.

The following were elected active members: Bradley Moore Davis, University of Chicago; Sir William Dawson, Montreal; Dr. James Ellis Humphrey, Johns Hopkins University; Prof. Daniel T. MacDougal, University of Minnesota; Prof. Frederick C. Newcombe, University of Michigan; Prof. Henry H. Rusby, New York College of Pharmacy; Prof. Harry L. Russel; University of Wisconsin; Dr. Joseph N. Rose, U. S. National Museum; Mr. Walter T. Swingle, U. S. Department of Agriculture.

The report of the Treasurer showed a balance of $684.15.

Titles of the papers read are as follows:

"A Case of Ecblastesis and Axial Prolification in *Lepidium apetalum*," by B. L. Robinson.

"Movement of Protoplasm in coenocytic Hyphae," by J. C. Arthur.

"The Pollen Grain and the Antipodal Region," by John M. Coulter.

"The Transition Region in the Caryophyllales," by Frederick E. Clements, presented by Prof. C. E. Bessey.

"A Revision of the Species of *Picea* occurring in Northeastern North America," by D. P. Penhallow.

"Account of a recent Visit to the Island of Jamaica, and a Discussion of the Availability of that Island as a Location for a proposed Botanical Laboratory," by D. T. MacDougal and D. H. Campbell.

"Spermatozoids in *Zamia*," by H. J. Webber (by invitation of the Council).

"Bibliographical Difficulties," by Edward L. Greene.

Officers for the next year were elected as follows: President, N. L. Britton; Vice-President, J. C. Arthur; Secretary, Charles R. Barnes; Treasurer, Arthur Hollick; Councillors, B. L. Robinson, F. V. Coville. It was resolved that the next meeting be held in Boston, Mass., in August, 1898.

Titles of Papers read before the Section of Botany, A. A. A. S., Detroit Meeting, August, 1897.

The Section organized with Prof. G. F. Atkinson, Vice-President, in the chair, and Prof. F. C. Newcombe, Secretary.

Trillium grandiflorum (Michx.) Salisb.; its Variations, normal and teratological. By Prof. Charles A. Davis, Alma College, Alma, Mich.

A Discussion of the Structural Characters of the Order Pezizinae of Schroeter. By Dr. E. J. Durand, Cornell University, Ithaca, N. Y. (By title.)

The Taxonomic Value of Fruit Characters in the Genus *Galium*. By K. E. Wiegand, Cornell University, Ithaca, N. Y. (By title.)

Report upon the Progress of the Botanical Survey of Nebraska. By Prof. Chas. E. Bessey, University of Nebraska, Lincoln, Neb.

Changes during Winter in the Perithecia and Ascospores of certain Erysipheae. By B. T. Galloway, Department of Agriculture, Washington, D. C. (By title.)

The Erysipheae of North America: a preliminary account of the distribution of the species. By B. T. Galloway, Department of Agriculture, Washington, D. C. (By title.)

Some Contributions to the Life-History of *Haematococcus*. By Prof. L. R. Jones, University of Vermont, Burlington, Vt. (By title.)

Bacteriosis of Carnations. By Albert F. Woods, U. S. Dept. of Agriculture, Washington, D. C.

Wakker's Hyacinth Bacterium. By Dr. Erwin F. Smith, Dept. of Agriculture, Washington, D. C.

Notes on some new Genera of Fungi. By Prof. George F. Atkinson, Cornell University, Ithaca, N. Y. (By title.)

Are the Trees receding from the Nebraska Plains? By Prof. Charles E. Bessey, University of Nebraska, Lincoln, Neb.

Reproductive Organs and Embryology of *Drosera*. By C. A. Peters, Normal School, Edinboro, Penn.

Development of some Seed-coats. By Dr. J. O. Schlotterbeck, University of Michigan, Ann Arbor, Mich.

Contributions on wild and cultivated Roses of Wisconsin and bordering States. By J. H. Schuette, Green Bay, Wis.

Morphology of the Flower of *Asclepias Cornuti*. By Fanny E. Langdon. Reported by Prof. V. M. Spalding, University of Michigan, Ann Arbor, Mich.

Comparison of the Pollen of *Pinus*, *Taxus* and *Peltandra*. By Prof. George F. Atkinson, Cornell University, Ithaca, N. Y.

Some Characteristics of the Foothill Vegetation of Western Nebraska. By Prof. Charles E. Bessey, University of Nebraska, Lincoln, Neb.

On the Distribution of Starch in woody Stems. By Prof. Bohumil Shimek, University of Iowa, Iowa City, Iowa. (By title.)

Mechanism of Root Curvature. By Dr. J. B. Pollock. Reported by Prof. V. M. Spalding, University of Michigan, Ann Arbor, Mich.

The toxic Action of Phenols on Plants. By Prof. R. H. True and C. G. Hunkel, University of Wisconsin, Madison, Wis.

Cellulose-Ferment. By Prof. F. C. Newcombe, University of Michigan, Ann Arbor, Mich.

Is the characteristic Acridity of certain Species of the Arum Family a mechanical or a physiological Property or Effect? By Chas. Porter Hart, M.D., Wyoming, Ohio.

How Plants flee from their Enemies. By Prof. W. J. Beal, Michigan Agricultural College, Agricultural College P. O., Mich.

Stomata on the Bud-scales of *Abies pectinata*. By Dr. Alex. P. Anderson, Botanist of Exp. Station, Clemson College, South Carolina.

Comparative Anatomy of the normal and diseased Organs of *Abies balsamea* (L.) Miller, affected with *Aecidium elatinum* (Alb. et Schwein.) By Dr. Alex. P. Anderson, Botanist of Exp. Station, Clemson College, South Carolina.

On a new and improved Self-Registering Balance. By Dr. Alex. P. Anderson, Botanist of Exp. Station, Clemson College, South Carolina.

The Correlation of Growth under the Influence of Injuries. By Dr. C. O. Townsend, Columbia University, New York, N. Y.

The Botanical Collection of the Cornell Arctic Expedition of 1896. By Prof. W. W. Rowlee and K. M. Weigand, Cornell University, Ithaca, N. Y. (By title.)

Description of *Bacillus Phaseoli* n. sp., with some Remarks on related Species. By Dr. Erwin F. Smith, Vegetable Pathologist, Washington, D. C.

Notes on Jamaica. By Prof. Douglas H. Campbell, Stanford University, Cal.

On the Nature of certain Pigments, produced by Fungi and Bacteria with special reference to that produced by *Bacillus solanacearum*. By Dr. Edward F. Smith, Vegetable Pathologist, Washington, D. C.

Reviews.

Laboratory Practice for Beginners in Botany. By William A. Setchell. Macmillan Company. 1897.

The increased attention that has been given to botany in recent years has naturally resulted in greatly adding to our knowledge of plant-life, and the attempt to keep the student in school and university abreast of this information, has necessitated many text-books. So rapidly is the science advancing that what is along the out-post to-day, may become the rear-guard of to-morrow, and teachers in seeking the best methods of imparting information to the students under their charge have often devised plans of presentation that seemed adopted to wider audiences. This little book by Professor Setchell is an example of such conditions. After experimenting with a number of classes of beginners, both in the preparatory schools and in the university, he has come, as he tells us in the preface, to the conclusion that botany should be taught "1. As a science, to cultivate careful and accurate observations, together with the faculty of making from observations the proper inferences; and 2. As a means of leading the mind of the student to interest itself in the phenomena of nature for its own further development and profit." Along these lines the book seems to be fairly well executed. It is devoted almost exclusively to the higher plants, and, beginning with the seed, follows the familiar practise of directing the student's attention to the salient features of plant-organs and plant-phenomena through the complete life cycle. It suggests what the student shall look for, but does not aim to tell what will be seen. The student must reach and record the observations for himself, and will of course be benefited by the process. It will prove a useful book in the grades for which it is intended.

F. H. K.

Botanical Notes.

Fasciation.—Perhaps owing to the unusual amount of rain in New England, there has been this season a frequent manifestation

of fasciation. I have observed it in two genera of which I have no previous record, viz.: *Solidago* and *Saxifraga*. A specimen of *Solidago nemoralis* so affected was sent me about August 30th. It exhibited the usual phenomena of a flattened stem bearing many branches of abnormal inflorescence. I did not notice that any individual flowers were affected.

The *Saxifraga Virginiensis*, similarly fasciated, was collected near Providence in May.

Wm. Whitman Bailey.

Brown University,
Providence, September 7, 1897.

Pods and Seeds of Leguminosae wanted.—Prof. L. H. Pammel asks us to state that he desires to obtain fresh material of mature or nearly mature pods and seeds of the Leguminosae of the northeastern United States.

Index to recent Literature relating to American Botany.

Abbott, R. G. Electrical Attraction of Trees. Gard. & For. **10**: 297. 28 Jl. 1897.

Ashe, W. W. A new Hickory, *Hicoria pallida*. Gard. & For. **10**: 304–305. *f. 39*. 4 Au. 1887.
From the southern states.

Dock, M. L. *Viburnum dentatum*. Gard. & For. **10**: 332. *f. 43*. 25 Au. 1897.

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